

CLAIMS

1. A method for cooperative rasterization of print data in an enterprise network, the enterprise network including multiple printers, the method comprising:

rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer;

identifying, by the primary printer, a potential underflow condition of the raster buffer;

responsive to identifying, the primary printer communicating an un-rasterized portion of the print job to the secondary printer for the secondary printer to rasterize, the primary printer not rasterizing the un-rasterized portion;

receiving, by the primary printer, raster bits corresponding to the un-rasterized portion from the secondary printer; and

printing, by the primary printer, all raster bits corresponding to the print job.

2. A methods as recited in claim 1, wherein identifying further comprises:

evaluating, by the primary printer, whether communicating the un-rasterized portion to the secondary printer would at least minimize the potential underflow condition; and

only performing the communicating if the evaluating indicates that operations of the secondary printer to assist the primary printer in its rasterization operations would at least minimize the potential underflow condition.

3. A method as recited in claim 2, wherein evaluating further comprises determining objective criteria comprising respective amounts of time for: the primary printer to transmit the un-rasterized portion to the secondary printer, the secondary printer to rasterize the un-rasterized portion, and the primary printer to receive the raster bits from the secondary printer.

4. A method as recited in claim 3, wherein the respective amounts of time are based on data persisted by the primary printer.

5. A method as recited in claim 2, wherein evaluating further comprises determining, by the primary printer, that operations of the secondary printer to assist the primary printer in its rasterization operations would eliminate the potential underflow condition.

6. A method as recited in claim 1, wherein the method further comprises:
- responsive to identifying, the primary printer calculating a number of secondary printers of the multiple printers to communicate respective un-rasterized portions of the print job to respectively rasterize, the secondary printer being included in the number, the un-rasterized portion being included in the respective unrasterized portions;
 - not rasterizing, by the primary printer, any of the respective un-rasterized portions;
 - wherein communicating further comprises, the primary printer sending the un-rasterized portions to respective ones of the number of secondary printers; and
 - wherein receiving further comprises, receiving, by the primary printer, raster bits corresponding to the respective un-rasterized portions from respective ones of the number of secondary printers.

7. A method as recited in claim 6, wherein sending and receiving at least minimizes the potential underflow condition.

8. A method as recited in claim 6, wherein sending and receiving eliminates the potential underflow condition.

9. A method as recited in claim 6, further calculating the number of secondary printers further comprises determining the number according to the following:

$$SecondaryPrinterCount = \left\lceil \frac{RipTime - PrintEngineTime}{PrintEngineTime} \right\rceil.$$

10. A method as recited in claim 6, further calculating the number of secondary printers further comprises determining the number according to the following:

$$Secondary\ Print\ er\ Count = \left\lfloor \frac{RIPTime\ for\ a\ Single\ Page}{Transfer\ Time + Re\ ceive\ Time} \right\rfloor.$$

11. A computer-readable medium comprising computer-program instructions executable by a processor coupled to the computer-readable medium, the computer-program instructions comprising instructions for performing operations such as those recited in a method as recited in claim 1.

12. A computer-readable media comprising computer-program instructions for cooperative rasterization of print data in an enterprise network, the enterprise network including multiple printers, the computer-program instructions comprising instructions for:

rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer;

identifying, by the primary printer, a potential underflow condition of the raster buffer; and

responsive to identifying:

evaluating, by the primary printer, whether communicating the un-rasterized portion to the secondary printer would at least minimize the potential underflow condition; and

if the evaluating indicates that operations of the secondary printer to assist the primary printer in its rasterization operations would at least minimize the potential underflow condition, communicating the un-rasterized portion to the secondary printer for the secondary printer to rasterize, the primary printer not rasterizing the un-rasterized portion, the primary printer being configured to receive and print raster bits corresponding to the un-rasterized data.

13. A computer-readable medium as recited in claim 12, wherein the computer-program instructions further comprise instructions for:

receiving, by the primary printer, raster bits corresponding to the un-rasterized portion from the secondary printer; and

printing, by the primary printer, all raster bits corresponding to the print job.

14. A computer-readable medium as recited in claim 12, wherein evaluating further comprises instructions for determining objective criteria comprising respective amounts of time for: the primary printer to transmit the un-rasterized portion to the secondary printer, the secondary printer to rasterize the un-rasterized portion, and the primary printer to receive the raster bits from the secondary printer.

15. A computer-readable medium as recited in claim 12, wherein evaluating further comprises determining, by the primary printer, that operations of the secondary printer to assist the primary printer in its rasterization operations would eliminate the potential underflow condition.

16. A computer-readable medium as recited in claim 12, wherein the computer-program instructions further comprise instructions for:

calculating a number of secondary printers of the multiple printers to communicate respective un-rasterized portions of the print job to respectively rasterize, the secondary printer being included in the number, the un-rasterized portion being included in the respective unrasterized portions;

not rasterizing, by the primary printer, any of the respective un-rasterized portions;

communicating the primary printer sending the un-rasterized portions to respective ones of the number of secondary printers;

receiving, by the primary printer, raster bits corresponding to the respective un-rasterized portions from respective ones of the number of secondary printers; and

printing, by the primary printer, all raster bits corresponding to the print job.

17. A computer-readable medium as recited in claim 16, wherein the instructions of calculating the number of secondary printers further comprises:

determining a rasterization time (RIptime) to rasterize a portion of the un-rasterized portions;

determining a transmit time to send the portion to a secondary printer of the secondary printers;

determining a receive time for the primary printer to receive raster bits corresponding to the portion from the secondary printer;

resolving that the transmit time plus the receive time is greater than an amount of time (PrintEngineTime) that the primary printer would take to print a single page of the print job; and

responsive to resolving, formulating the number of secondary printers according to the following:

$$SecondaryPrinterCount = \left\lceil \frac{RIptime - PrintEngineTime}{PrintEngineTime} \right\rceil.$$

18. A computer-readable medium as recited in claim 16, wherein the instructions of calculating the number of secondary printers further comprises:

determining a rasterization time (RIptime) to rasterize a page of the unrasterized portions;

determining a transmit time to send the page to a secondary printer of the secondary printers;

determining a receive time for the primary printer to receive raster bits corresponding to the page from the secondary printer;

resolving that the transmit time plus the receive time is greater than an amount of time (PrintEngineTime) that the primary printer would take to print raster bits corresponding to a single page of the print job; and

responsive to resolving, formulating the number of secondary printers according to the following:

$$SecondaryPrinterCount = \left\lfloor \frac{RIptime}{transfer\ time + receive\ time} \right\rfloor.$$

19. A computing device for cooperative rasterization of print data in an enterprise network, the enterprise network comprising a primary printer and at least one secondary printer, the computing device comprising:

a processor; and

a memory coupled to the processor, the memory comprising computer-program instructions executable by the processor, the computer-program instructions comprising instructions for:

sending, by the primary printer, an un-rasterized portion of the print job to a secondary printer in the enterprise;

receiving, by the primary printer, associated raster bits from the secondary printer, the associated raster bits having been generated by the secondary printer from the un-rasterized portion; and

responsive to receiving, inserting, by the primary printer, the associated raster bits into the raster buffer such that raster buffer underflow conditions are avoided at the primary printer.

20. A computing device as recited in claim 19, wherein the computer-program instructions further comprise instructions for:

evaluating in view of anticipated raster buffer underflow whether the primary printer will complete printing the print job faster than if the secondary printer assists the primary printer to rasterize an un-rasterized portion of the print job; and

performing the operations of sending, receiving, and inserting only if it has been determined that the primary printer will not print the print job as quickly without rasterizing assistance from the secondary printer.